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Final Report on Contract Nonr-849(00) -- NR 046-730

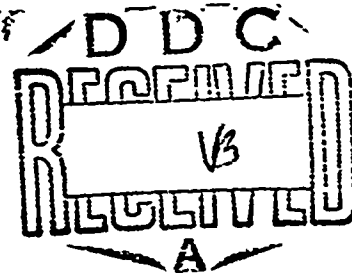
MEASUREMENT OF VISUAL DOUBLE STARS  
BY INTERFEROMETER AND MICROMETER

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*Raymond H. Wilson Jr.*

Raymond H. Wilson, Jr.  
Department of Mathematics  
College of Arts and Science

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As called for in the schedule of this contract, the Investigator conducted basic astronomical research involving interferometer and micrometer measurements of double stars during 2 months, July and August 1952.

The measurements of these stars were all performed by means of the 18-inch refracting telescope of the Flower Astronomical Observatory of the University of Penna., Upper Darby, Pa. By courtesy of the officials of the University of Pennsylvania, this telescope was available to the investigator for this purpose, during at least half the night on 60 nights. Measurements of double stars were actually performed on 40 nights. On the remaining nights measuring work was impossible due to cloudiness or other adverse atmospheric conditions.

Altogether, 176 separate positive measurements were made on 84 different stars. In addition, 54 negative or uncertain observations were made on these same stars, and 4 negative or uncertain observations of 2 other stars. Thus, in total, 234 observations were made of 86 different stars. The majority of the pairs were closer than one-half second of arc separation.

Stars generally were chosen for observation when such measures promised material contribution to determination of their orbits and, consequently, their masses. Pairs known to be rapid and/or difficult and poorly followed by observers were especially favored, and considerable search of the literature was conducted to make the program most useful. Outside of Aitken's Catalogue, several close pairs were included from Rossiter's long lists, fast proper motion dwarfs noted by parallax

observers, and two white dwarfs from Lytton's Atlas were attempted. Seven stars were included because their orbits had been computed by the present Investigator, and about 15 others because possibility of their orbit computation was an immediate prospect.

An orbit was computed for the star ADS 4971- two orbits, in fact, since possible indeterminateness of quadrant made either an orbit with low eccentricity and high inclination, or one of half the period, i.e. about 27 yrs., with very high eccentricity on almost equal possibility. It was later discovered that in 1951 Muller of Strasbourg had published an orbit of the same star, but having more than three times the longest period found here, so the present computation is definitely a new orbit. Up to 1950 the representations are almost equally good; but before 1955 the orbits will be widely divergent, and the observations made this summer favor an orbit of much shorter period than that found by Muller.

The construction of an eyepiece interferometer, for which a special Instrument Fund was granted is now well under way. The technical work on this new instrument is being carried out by the Optical Film Engineering Co. of Phila., whose President, Mr. Thos. L. Scatchard, has taken special interest in the project, from the time of its proposal. In collaboration with the Investigator who computed the necessary dimensions, a complete small-scale optical model of this instrument was set up on Scatchard's optical bench and it now remains only to turn out the metal parts upon which the optical parts will then be mounted and tested. It is designed for immediate mount in any standard  $1\frac{1}{4}$  in. eyepiece holder and for

optical suitability with any objective having up to  $f/20$  focal ratio.

A complete report of the work done in the summer of 1951 on Contract Nonr 468(00) has been submitted to the Editors of the Astronomical Journal, and can be expected to appear there shortly. It is also planned to submit a complete report of work on the present contract, including the orbit of ADS 4971 to the same journal sometime in the near future.